

VOLUME II

# ***CONSTRUCTION SPECIFICATIONS AND DRAWINGS***



***Installation of a  
Precision Approach Path Indicator  
to serve RWY 12  
at the  
Ely Airport/ Yelland Field  
in  
Ely, NV***

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***Prepared by:  
FEDERAL AVIATION ADMINISTRATION  
AIR TRAFFIC ORGANIZATION  
TECHNICAL OPERATIONS UNIT  
WESTERN SERVICE AREA  
ENGINEERING SERVICES  
NAVAIDS ENGINEERING GROUP  
NAVAIDS ENGINEERING CENTER - SEATTLE***

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## **SECTION 01010**

### **SUMMARY OF WORK**

#### **PART 1 GENERAL**

##### **1.1 SCOPE OF WORK**

The work covered under this specification includes the installation of a Precision Approach Path Indicator (PAPI) to serve runway 12 at Ely Airport/ Yelland Field, Ely, Nevada.

The contractor is required to furnish all labor, materials (except Government furnished), services, equipment, insurance, bonds, security notifications, licenses, permits, and fees in accordance with applicable federal, state and local regulatory requirements to complete the specified work. Any miscellaneous labor, equipment and/or materials not specifically detailed or specified, but required to complete the project, shall be provided as an integral part of the work.

The dimensions, measurements, and quantity of materials listed in this specification and on the construction drawings are estimated and are presented to give the contractor an idea of the total scope of work. The contractor is strongly encouraged to make a site visit to verify the existing conditions, quantities of materials, and amount of work required. The contractor is responsible for assuring that the bid reflects all work required to accomplish this project. Coordinate site visit with the FAA Project Engineer, Edson Reyno (425) 227-2479.

##### **1.1.1 Installation of the PAPI LHA's**

Contractor shall install the four Light Housing Assembly (LHA) units as indicated on the construction drawings. Work includes: Installation of the LHA concrete foundations and associated grounding; and Installation of the LHA Equipment.

##### **1.1.2 Installation of the PAPI Power and Control Station**

Contractor shall install the PAPI power and control (P/C) station as indicated on the construction drawings. Work includes: Installation of the concrete foundation and associated grounding; and Installation of the P/C rack and equipment.

##### **1.1.3 Installation of Power and Control for the PAPI LHA's**

Contractor shall install the power and control for the PAPI LHA's as indicated on the construction drawings. Work includes: Installation of the pull box near the PAPI P/C station; and Installation of power & control conduits and conductors between the P/C station and the LHA's.

#### **1.1.4 Installation of the Power Service for the PAPI**

Contractor shall install the equipment to obtain power to the PAPI P/C station as indicated on the construction drawings. Work includes: Installation of power equipment from the transformer at the VOR location to the PAPI P/C station (approximately 1600').

#### **1.1.5 General Site Work**

Contractor shall perform the general site work as indicated on construction drawings. Work includes: Installation of the fabric, road asphalt, road base and rock around the LHA's and P/C station.

### **1.2 REFERENCES**

Airport Ground Vehicle Operations Guide

available from: [http://www.asy.faa.gov/safety\\_products/airportground/AGVO-guide.doc](http://www.asy.faa.gov/safety_products/airportground/AGVO-guide.doc)

### **1.3 DRAWINGS**

Callouts on the construction drawings indicate work to be done under this contract unless specifically noted "installed by others" or "existing". Callouts indicating work to be done do not always include the word "install".

#### **1.3.1 Construction Drawings Provided**

Drawings applicable to this project are listed below. The written scale (e.g. 1"=100') is only valid for FAA "D - size" drawings (22"x34") and may be slightly off due to variations in printing. On reduced size drawings, the bar scales (where shown) and written dimensions remain valid.

ELY-B -PAPI12-G001 VICINITY LAYOUT  
ELY-B -PAPI12-G002 LAYOUT DETAILS  
ELY-B -PAPI12-G003 LHA, INSTALLATION DETAILS  
ELY-B -PAPI12-G004 POWER AND CONTROL STATION, INST DTL'S  
ELY-B -PAPI12-G005 HELICAL PIER FOUNDATION DETAILS  
ELY-B -PAPI12-G006 SYSTEM WIRING DIAGRAM  
ELY-B -PAPI12-G007 ASPHALT ROAD

#### **1.3.2 As-Built Drawings**

The contractor shall provide three complete sets of As-Built drawings to the FAA Project Engineer at the end of the project. The following color codes shall be used:

- Red - to indicated new or changed information
- Green -to indicated deletions
- Blue - to indicate notes to the draftsman

Any additional diagrams and/or schematics that would be helpful for the maintenance of the facility should also be included.

## **1.4 SUBMITTALS**

### **1.4.1 Material**

The contractor shall submit for approval; catalog data, cut-sheets, samples, and any other relevant information on the contractor furnished material to be used on this project. Two copies of the submittal package shall be given to the FAA Project Engineer for approval. Submittals on materials shall include, but is not limited to:

- Coated galvanized ridged steel conduit.
- Cement concrete material.
- Geotextile fabric.
- Aggregate material.
- Rotomilled asphalt material
- Contractor furnished hardware.
- Contractor furnished electrical fittings and components.
- Contractor furnished cable and wire.
- Labels.
- Noalox®.
- Additional items deemed necessary by the Project Engineer.

### **1.4.2 Schedule**

Prior to start, the contractor shall submit a schedule and work plan to the Project Engineer for approval. See section 3.1.2 for the maximum time allowed to complete this project. The schedule shall show start dates, duration, and finish dates for each work activity. Activities shall include, but are not limited to:

- Site layout.
- Installation of LHA foundations.
- Installation of the PAPI P/C station foundation.
- Installation of power and control for the PAPI LHA's.
- Installation of power equipment from VOR to the PAPI P/C station.
- Site work.
- Inspection and cleanup.

The FAA reserves the right to modify the contractor's sequence of activities in the interest of facility operation and airport safety.

### 1.4.3 Schedule of Values

The contractor's proposal shall include a schedule of values, showing at a minimum, a breakdown of cost for each work activity listed in the work schedule / below. Cost for each item should include any profit and overhead.

• Site layout.	\$ . _____.
• Installation of LHA foundations.	\$ . _____.
• Installation of the PAPI P/C station foundation.	\$ . _____.
• Installation of power and control for the PAPI LHA's.	\$ . _____.
• Installation of power equipment from VOR to the PAPI P/C station.	\$ . _____.
• Site work.	\$ . _____.
• Inspection and cleanup.	\$ . _____.
 TOTAL PROJECT COST	 \$ . _____.

### 1.4.4 Safety Plan

The contractor shall submit a safety plan per paragraph 3.4.2.6 of this section.

### 1.4.5 Work Plan

The contractor shall submit a work plan per paragraph 3.4.5 of this section.

### 1.4.6 Testing

The contractor shall complete, at his own expense, all testing as required by these specifications. The results shall be submitted to the FAA Project Engineer. Required testing includes, but is not limited to, the following:

- Cable insulation resistance test (see FAA-C-1217f, 5.3.4)
- Earth resistance test (see FAA-C-1217f, 5.3.6)
- All Required Concrete Testing (performed by an independent testing company).
- Soil Compaction Testing (performed by an independent testing company).

## PART 2 PRODUCTS

Reference herein or in the construction drawings to any specific commercial product, process, or service, any trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the Federal Aviation Administration. The contractor may submit a request for substitution of a product, process, or service specifically called out. Such request shall be through the submittal process.



## 2.1 GOVERNMENT FURNISHED MATERIAL

Government furnished material (GFM) for this project is listed as follows:

<u>QTY</u>	<u>ITEM</u>
4 ea.	Lamp Housing Assembly (LHA)
1 ea.	Power and Control Assembly (PCA)
1 ea.	Aiming Instrument Set
1 ea.	PAPI Instruction Book
1 ea.	Air/Ground-Receiver/Controller, Control Industries model RC 1T5A
32 ea.	2" Frangible Couplings

Note: The contractor shall pick up all Government Furnished Material (except for the equipment shelters) at the Ely Airport Office. Contact Edson Reyno, FAA Project Engineer, at 425-227-2479 (at least 72 hours in advance) for coordination of pick up. The contractor is responsible for the loading, transportation, and unloading of material.

### 2.1.1 Inventory and Inspection of GFM

The contractor shall sign a copy of the Government furnished material (GFM) list acknowledging receipt of the furnished material, noting any discrepancies if necessary. When the contractor signs for custody, he/she acknowledges receipt in good condition and assumes responsibility for any subsequent loss or damage. The contractor shall return all GFM that is not installed to the location where the material was picked up.

## 2.2 CONTRACTOR FURNISHED MATERIAL

The contractor shall furnish all material that is required and not otherwise indicated to be Government furnished. Materials furnished by the contractor shall be new, the standard products of manufacturers regularly engaged in the production of such materials, and of the manufacturer's latest designs that comply with the specification requirements.

The contractor is responsible for making their own arrangements for material delivery and receiving. The contractor shall not have any material delivered to any FAA offices. Delivery to the Airport address shall only be done with the prior approval of the airport management.

The list of contractor furnished material includes, but is not limited to:

- 2 each Pull Box's, as required

- Helical Piers, as required (Contractor is encouraged to install one or more test piers to confirm soil conditions).
- Concrete, re-bar, anchor bolts, cable markers, etc.
- Power, control, and grounding cable, as required.
- Ground rods, #1/0 bare copper guard wire, exothermic welds and misc. hardware for grounding system.
- Geotextile fabric, as required.
- Aggregate material / Rotomill, as required.
- Coated galvanized rigid metal conduit, EMT, and PVC conduit as required.
- Electrical fittings and components, as required.
- Misc. hardware and Unistrut, as required.
- Labels for electrical components, cables, pull box's, etc.
- Floor flanges, as required.
- 2 each 60 Amp Heavy duty safety switch (fused at 30 amps).

## **2.3 MATERIAL**

### **2.3.1 External Hardware**

All external hardware shall be hot dipped galvanized, stainless steel, or approved for long term outdoor use. All cut edges shall be filed smooth and treated with a cold galvanizing compound.

### **2.3.2 Galvanized Rigid Metal Conduit (GRMC)**

All galvanized rigid metal conduit (GRMC) installed below slab, on grade, or underground shall be coated. GRMC shall conform to Steel Structures Painting Council Standard, SSPC-PS 10.01), or be field wrapped with 0.01 inch thick pipe wrapping plastic tape applied with 50% overlap. Fittings used underground shall be protected by field wrapping as specified herein for conduit.

### **2.3.3 Anti-oxidant compound**

Use an anti-oxidant compound on all external threads, insertions, and connections.

#### **2.3.4 Asbestos Free Material**

The Contractor shall not use any asbestos containing material (ACM) at any time during the construction. The Contractor shall verify that all material, including those supplied by third parties, are asbestos free materials. A written certification letter shall be provided by the Contractor to the FAA certifying that the finished work is asbestos free.

### **PART 3 EXECUTION**

#### **3.1 SCHEDULES**

##### **3.1.1 Work Schedule**

All work shall be performed during the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday. No work shall be performed outside these hours or scheduled on Saturdays, Sundays or legal holidays without prior approval from the FAA Project Engineer.

The contractor shall furnish the Resident Engineer with emergency (24 hour) contact phone numbers for the contractor's superintendent and an alternate individual. Such numbers will be used if the contractor needs to be contacted outside of normal working hours.

##### **3.1.2 Construction Schedule**

All work shall be completed within 21 calendar days after the Notice to Proceed (NTP).

##### **3.1.3 Weekly Look Ahead Work Schedule**

On a weekly basis, the contractor shall submit a schedule showing activities desired to be performed during the upcoming week. These work activities shall be approved by the FAA Project Engineer.

##### **3.1.4 Deviation from Work Schedule**

The Airport Manager and the FAA Project Engineer reserve the right to suspend or stop construction as necessary for the safety of aircraft or airport property. In addition, the FAA may adjust the work hours to satisfy the facility operations.

##### **3.1.5 Daily Construction Log**

The Contractor shall keep a Daily Construction Log. At a minimum, the daily log shall contain:

- Items accomplished for that day.
- Start and stop time of work.
- Name of workers (including sub-contractors), and hours they worked for that day.
- Weather (including sky, ground moisture conditions, and temperature).
- Material received.

- Documental photographs showing the progress of work, and as required.

The Daily Construction Logs shall be turned over to the FAA Project Engineer on a weekly basis.

### **3.2 PRE-CONSTRUCTION MEETING**

Prior to the start of any work and the contractor's access to the work site, the contractor shall be required to attend a pre-construction meeting. Attendees at the meeting may include, but is not limited to; the FAA Project Engineer, Resident Engineer, FAA Contracting Officer, the Airport Manager, Airport Operations, FAA maintenance, and other interested parties as determined by the Project Engineer. Topics at the meeting will include; site access, airport security, work safety, work schedule, project expectations, work procedures, emergency plans, and other items relating to the execution of the project.

### **3.3 LAYOUT**

The contractor shall verify the field measurements and coordinates indicated on the drawings with the FAA Project Engineer before starting any layout. The contractor shall lay out his work from base lines and bench marks indicated on the drawings and shall be responsible for all measurements in connection therewith. The contractor shall furnish, at his own expense, all stakes, templates, platforms, equipment, tools, materials and labor as may be required in laying out any part of the work. All layout work shall be accomplished by a Professional Land Surveyor. The contractor is to properly maintain the specified layouts to assure proper alignment of the construction. Roads indicated to be installed under this contract shall be laid out and clearly marked at the beginning of the project and used as access roads during construction so as to minimize the disturbance to the surrounding areas.

### **3.4 SPECIAL REQUIREMENTS**

#### **3.4.1 Special Precautions**

The contractor shall conform to the rules and regulations of the airport and shall coordinate all work with the FAA Project Engineer.

Note: Unscheduled interruptions of the electrical service to FAA facilities may cause aircraft accidents and loss of life. Work requiring a temporary or permanent de-energization of equipment shall be scheduled in writing with the FAA Project Engineer and the onsite FAA maintenance personnel. Only onsite FAA maintenance personnel are authorized to energize/de-energize equipment, or to operate a circuit breaker, switch, or fuse in an FAA facility.

#### **3.4.2 Safety Requirements**

Aviation Safety is a primary consideration during airport construction. The Contractor is completely responsible for complying with the Airport's safety and operation procedures, as dictated by the Airport.

During the performance of this contract, the airport runways, taxiways, and aircraft parking aprons shall remain in use by aircraft to the maximum extent possible, CONSISTENT WITH CONTINUAL SAFETY. The contractor shall not allow employees, subcontractors, suppliers, or any other unauthorized person to enter or remain in any airport area which would be hazardous to persons or to aircraft operations.

#### **3.4.2.1 Runway Safety and Object Free Areas**

The Runway Safety Area (RSA) for runway 12 at Ely Airport is a rectangular area extending 60 ft on each side of the runway centerline and 240 ft beyond (downwind) the end of the runway threshold.

Prior to commencement of work, the contractor shall delineate the boundaries of the safety area with 3/8" x 1 1/2" x 4' long pointed lath (survey sticks) and bright orange flagging.

The contractor shall not be allowed into the Runway Safety Area without prior approval from the FAA Project Engineer and the Airport Manager. In general, no workers or equipment shall be allowed inside the safety area when aircraft are using the runway. Work to be done inside the safety area shall be scheduled and closely coordinated with the FAA Project Engineer and the Airport manager.

The contractor shall not be allowed to place vehicles and/or equipment inside the Runway Object Free Area (OFA) without the approval of the FAA Project Engineer. The Runway Object Free Area (OFA) for runway 12 at Ely Airport is a rectangular area extending 125 ft on each side of the runway centerline and 240 ft beyond (downwind) the end of the runway threshold.

In addition to the restrictions of working in the Runway Safety area and Object Free Area, the Airport Manager and/or the FAA Project Engineer may impose more restrictive requirements as needed to maintain airport safety.

#### **3.4.2.2 Approach Surface**

No vehicles or equipment shall be permitted to penetrate an approach surface (extended along the runway centerline) of 20:1 for visual runways, 34:1 for runways with a non-precision approach, or 50:1 for runways with an operational ILS. The approach surface begins at the runway threshold centerline elevation and starts 200 ft downwind from the threshold (or from the location of the Displaced/Relocated threshold).

#### **3.4.2.3 Construction Vehicle Traffic**

The contractors' vehicles and equipment shall enter the work site and construction areas at approved locations, and by way of authorized routes. The use of runways, aprons, taxiways, ramps, will not be permitted unless specifically approved by the FAA Project Engineer and the Airport Manager. The contractor shall inform all personnel that aircraft have the right-of-way at

all times. The contractor shall be responsible for maintaining control and security at each entry point, as approved.

As a minimum, all vehicles and motorized equipment that enter the Airport Operations Area (AOA) shall be marked per AC 150/5210-5B (or latest version). In general, all vehicles and motorized equipment inside the AOA shall be marked with a three foot by three foot flag with international orange and white 12 inch squares displayed in full view above the vehicles. At night, or during periods of low visibility, all vehicles and equipment operating in the AOA shall be identified with an approved yellow flashing beacon.

In addition, no personnel will be permitted to drive on the airside of the airport unless he/she has read, and certified that he/she has read, "A Guide to Ground Vehicle Operations on an Airport" (DOT/FAA/AS-90-3). A copy of this document is attached at the end of this specification.

THE AIRPORT AND/OR THE FAA MAY HAVE ADDITIONAL REQUIREMENTS FOR VEHICLES, EQUIPMENT, AND PERSONNEL OPERATING INSIDE THE AOA.

#### **3.4.2.4 Unauthorized Structures**

The contractor shall install no fences or other physical obstructions on or around the project work area without the approval of FAA Project Engineer.

#### **3.4.2.5 Hazard Marking**

The contractor shall use barricades, flashers, flags, traffic cones, signs, etc., for the following:

- To prevent aircraft from taxiing onto a closed runway, taxiway or apron.
- To outline construction/maintenance areas.
- To identify isolated hazard areas such as open manholes, ditches, potholes, waste areas, etc.
- To identify FAA and Airport facilities, cables, power lines, ILS Critical areas, and other sensitive areas, in order to prevent damage, interference and facility shutdown.

All hazard markings shall be furnished and setup by the contractor. Barricades inside the runway safety area shall be lightweight and frangible. For daytime use, barricades should be supplemented by flags; for night time use, they shall have flashing yellow lights. Night time barricades shall not penetrate the approach surface. All markings shall be to the approval of the FAA Project Engineer.

#### **3.4.2.6 Safety Plan**

Prior to commencement of work, the contractor shall submit a safety plan for approval by the Project Engineer. An acceptable safety plan shall take into account areas discussed in Appendix 1 of AC 150/5370-2C and the Airport's rules for construction activity at the Airport.

#### **3.4.3 Radio Communications**

The contractor's superintendent (or someone appointed by the superintendent) shall be required to monitor a transceiver radio at all times when the contractor is operating inside the runway safety area. The transceiver shall be contractor furnished with a frequency range of 118-136 Mhz and tuned to the local ATCT Tower or Ground Control (CTAF when tower is closed) frequency, UNICOM frequency, or as required. Such radios shall be used so that any unusual occurrence of approaching, departing, taxiing aircraft can be acknowledged by all concerned parties. The contractor's use of the transceiver radio is basically for listening purposes, transmitting should be in emergencies only.

#### **3.4.4 Work Limitations**

The contractor's activities shall be planned and scheduled to minimize disruption of normal aircraft activities. If the clearances and restrictions described in this section cannot be maintained while construction is underway (for example, when performing work that is required inside the runway safety area), action shall be taken to close runways (or taxiways, or aprons), and/or to perform work at night or during periods of minimal aircraft activity, as approved.

##### **3.4.4.1 Trenches, Holes, and Excavations**

Trenches, holes, and any other type of excavation within the runway safety area are not allowed without either closing the runway or adequately displacing/relocating the runway threshold to accommodate the work. If a runway closure or displacement/relocation of the runway threshold becomes necessary, the contractor shall submit a detailed plan which must be approved by the Airport and the FAA.

#### **3.4.5 Work Plan**

Prior to commencement of work, the contractor shall submit a work plan for approval by the Project Engineer (see 1.4). An acceptable work plan shall take into account all areas discussed in this section.

### **3.5 PROTECTION OF EXISTING UTILITIES AND CABLES**

The existing utility lines, utility structures and all underground cables, as may be shown on the drawings are approximate and incomplete. Where excavation occurs in the vicinity of existing utilities or cables, the contractor shall use whatever means necessary, including a private cable locator, to locate the existing utilities or cables prior to any excavation. The contractor shall stake all utility or cable crossings and such areas shall be hand excavated. The contractor shall

immediately repair any damage done by the contractor or suppliers to utilities or cable within the work area.

### **3.6 INSTALLATION AND WORKMANSHIP**

All work shall be performed according to the intent of the contract, and normal and accepted industry and Government standards.

All work shall be accomplished by skilled workers regularly engaged in this type of work. Where required by local regulations, the workers shall be properly licensed. Electrical terminations and splices shall be done by a qualified electrician.

The contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the Project/Resident Engineer in every way possible. The contractor shall have a competent superintendent on the work site at all times who is fully capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the Project/Resident Engineer.

An initial inspection shall be conducted when a representative sample of work has been completed. This work shall be approved by the FAA Project Engineer or his representative, prior to the commencement of additional work.

All conduits shall be completely cleaned prior to installing cable. A flexible mandrel shall be used to clean out mud, dirt, and debris from the raceways.

Underground conduits shall be installed so that no water can be trapped in the raceway (water must be able to drain out of one end).

All foundations, manholes, vaults, pull box's, equipment racks, buildings, roads, retaining walls and other above ground structures shall be installed square (perpendicular and parallel) to the runway centerline, prevailing structure or road as indicated on the drawings unless specifically indicated to be otherwise. Elevated conduits and structures (those extending above grade) shall be installed level and plumb. Unless otherwise indicated, maximum tolerance for vertical plumbness is  $\frac{1}{8}$ " horizontal for every four feet vertical. Exposed raceways shall be installed parallel to or at right angles with the lines of the finished structure, unless otherwise indicated.

Tops of foundations, cans, pull box's, manholes, vaults, etc., shall be uniform with the tops of concrete at the surrounding structures, natural grade or as indicated on the drawings or as directed by the Project Engineer. Unless otherwise indicated, top of foundations, cans, pull box's, manholes, etc. shall be level with a maximum tolerance of  $\frac{1}{16}$ " per foot.

Road curves shall be as indicated on the drawings or as indicated by the Project Engineer. Edges of roads, walkways and graveled areas shall be clean, sharp, and well defined. Installed surface material shall not be allowed to spill outside the defined edges.



Installed foundations, structures, walkways, and roads not meeting the above requirements shall be removed, disposed of, and re-installed correctly at the contractors expense.

### **3.7 TEMPORARY FACILITIES**

The contractor shall provide and pay for all temporary services and facilities as specified below and as necessary for the proper and expeditious execution of the work. The contractor shall make, or have made, all connections to existing services and sources of supply as necessary and/or indicated and pay all charges for same. All work under this Section shall comply with applicable laws, rules, regulations, codes, ordinances, and orders of all Federal, State, and Local authorities having jurisdiction for the safety of persons, materials and property. The contractor shall remove all such temporary installations and connections when no longer necessary for the project work.

#### **3.7.1 Temporary Water**

The contractor shall make arrangements to furnish a potable water supply for workers and project work, and pay for all water and services.

#### **3.7.2 Temporary Toilets and Sanitation**

The contractor shall provide ample and suitable on site sanitary conveniences with proper enclosures for the use by the workers, FAA personnel, and FAA support personnel. Such conveniences shall be kept clean, properly ventilated and installed and maintained in conformity with requirements of all laws and ordinances governing such installations. Locations shall be subject to the FAA Project Engineer's approval. After completion of the work such conveniences shall be removed from the site.

### **3.8 SECURITY REQUIREMENTS**

The contractor shall comply with all security requirements established by the Airport. Only direct construction support personnel, vehicles and/or equipment will be allowed to the construction site.

During construction operations, the contractor shall use only the access gates and haul roads that are designated by the FAA Project Engineer. The contractor shall be required to keep access gates guarded and closed during construction hours. The gate may be opened only for authorized vehicle traffic flow. At such times as this gate is not guarded, it shall be closed and securely locked. The contractor shall be held duly responsible to uphold the above security stipulations at all times during the progress of the construction project. No deviations from these security measures shall be allowed at any time.

### **3.9 SAFETY**

All work shall be accomplished in accordance with OSHA Regulations (Standards – 29 CFR), Part 1926, Safety and Health Regulations for Construction.

Protective Equipment, including personal protective equipment for eyes, face, head, and protective clothing shall be used wherever it is necessary by reasons of hazards or environment [1926.95].

- Head protective equipment (helmets) shall be worn in areas where there is a possible danger of head injuries from impact, flying or falling objects, or electrical shock and burns [1926.100].
- Eye and face protection equipment shall be worn when machines or operations present potential eye or face injury [1926.102].

Specific work and operations requiring the mandatory use of personnel protective equipment shall be determined by the FAA Project Engineer.

### **3.10 SEDIMENTATION, EROSION, AND DUST CONTROL**

The Contractor shall submit a plan for sedimentation, erosion, and dust control. The plan shall show best management practices such as the use of silt fencing and/or hay bales to filter sediments from runoff and the application of water as needed to control dust.

### **3.11 DEBRIS CONTROL AND CLEAN-UP**

The work site shall be kept clean and orderly during the progress of work. Special attention shall be exercised to prevent the production of FOD (foreign object debris) which could cause damage to aircraft and/or airport equipment. Prior to the Contract Final Inspection, the contractor shall clean all areas of the construction site. This shall include but is not limited to the dress-up, sweep-up, and re-seeding of all areas disturbed during construction. A NEAT FINAL APPEARANCE OF THE INSTALLED FACILITIES (INTERIOR AND EXTERNAL) SHALL BE EMPHASIZED! All clean-up work shall be to the approval of the FAA Project Engineer.

Upon completion of work, the contractor shall be required to obtain a letter from the Airport Manager indicating that the work area has been left in an acceptable condition. A copy of the letter shall be given to the FAA Project Engineer.

### **3.12 INSPECTION & ACCEPTANCE**

The Contractor shall maintain an adequate inspection system and perform such inspections to ensure that the work performed under the contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the Government.

THE PRESENCE OR ABSENCE OF A GOVERNMENT INSPECTOR DOES NOT RELIEVE THE CONTRACTOR FROM ANY CONTRACT REQUIREMENT.

The Government inspections and tests are for the sole benefit of the Government and do not-

- Relieve the Contractor of responsibility for providing adequate quality control measures;
- Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;
- Constitute or imply acceptance.

The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements. The Contractor shall promptly segregate and remove rejected material from the premises.

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**SECTION 02100**  
**SITE PREPARATION**

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## **SECTION 02100**

### **SITE PREPARATION**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide the labor, equipment and materials to clear and grub the site of all brush, trees, stumps, and other materials as specified herein.

#### **PART 2 PRODUCTS**

Not Used

#### **PART 3 EXECUTION**

##### **3.1 SITE BOUNDARIES**

The Contractor will locate all structures and access roads by establishing line and grade in the vicinity of each structure. The contractor shall verify established control points, perform any additional surveys and maintain control points as required to ensure the accuracy of the work.

##### **3.2 GRUBBING**

Grubbing shall consist of the removal and disposal of stumps, roots larger than 1-1/2 inches in diameter, matted roots, and subsurface piping, where indicated, from the designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for foundation purposes shall be excavated and removed to a depth of not less than 18 inches below the final ground elevation in areas indicated to be grubbed and in areas indicated as construction areas for access roads or walkways. Depressions made by grubbing shall be filled with suitable material and compacted such that the finished surface shall match the adjacent surface in composition, degree of compaction, and elevation.

##### **3.3 DISPOSAL OF CLEARED MATERIALS**

All brush, and other refuse from the clearing operations shall be removed from site and disposed of at the contractor's expense and at no extra cost to the Government. Disposal of material shall not be permitted on airport property.

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## **SECTION 02200**

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## **SECTION 02200**

### **EARTHWORK**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall perform and complete all work as necessary for excavation, filling, backfilling, and grading required on the applicable drawings and specified herein.

##### **1.2 REFERENCES**

The latest edition in effect of the following publications form a part of this specification and are applicable to the extent specified herein.

###### **1.2.1 American Association of State Highway and Transportation Officials (AASHTO)**

AASHTO-T99 Moisture-Density Relations of Soils

AASHTO-T191 Field Determination of Density of Soil in Place, Sand Cone Method

AASHTO-T204 Field Determination of Density of Soil in Place, Dry Cylinder Method

AASHTO-T205 Field Determination of Density of Soil in Place, Rubber Balloon Method

AASHTO-T233 Field Determination of Density of Soil in Place, Block, Chunk or Core

###### **1.2.2 American Society for Testing and Materials (ASTM) Standard**

ASTM D-424 Test for Plastic Limit and Plastic Index of Soils

## **PART 2      PRODUCTS**

Not Used

## **PART 3      EXECUTION**

### **3.1 EXCAVATION**

#### **3.1.1 Classification**

All material excavated is unclassified and can be accomplished by trencher or backhoe and will not require ripping or blasting.

#### **3.1.2 Drainage**

Excavation shall be performed so that the area of the site and the area immediately surrounding the site and affecting operations at the site will be continually and effectively drained. Water shall not be permitted to accumulate in the excavation. The excavation shall be drained by pumping or other satisfactory methods to prevent softening of the foundation bottom, undercutting of footings, or other actions detrimental to proper construction procedures.

#### **3.1.3 Freezing**

When freezing weather is expected, excavations shall not be made to the full depth, unless the footing concrete can be placed immediately. If excavation is already at full depth, the excavation shall be protected from frost.

#### **3.1.4 Excavation for Slabs and Footings**

The excavations shall conform to the dimensions and elevations of the drawings applicable to footings and other foundation structures which are cast in place.

##### **3.1.4.1 Limits**

Excavations below indicated depths shall not be permitted except to remove material consisting of shale, sod, clods, stones larger than 4 inches, organic debris, trash or frozen material. Such unsatisfactory material shall be removed to a depth of 6 inches and replaced with satisfactory fill material. Unauthorized over excavation for footings shall be replaced at no additional cost to the Government to the indicated excavation grade with concrete. Excavation shall extend a sufficient distance from footings to allow for placing and removal of forms, installation of services, and for inspection, except where the concrete for walls and footings is authorized by the Resident Engineer to be deposited directly against excavated rock surfaces.



### **3.1.5 Trench Excavation**

Trenches for direct earth burial cables, conduits and other utilities shall conform to the dimensions and elevations shown on the applicable drawings. The banks need not be kept vertical but may be sloped or widened to such general limits as may be set by the Resident Engineer, provided there is no interference with other utilities. The trench bottom shall be a minimum of 6 inches wide or as required to provide separation between power and control cables or between power cables of different voltages. The trench depth shall be deep enough to allow cable placement plus an over excavation of at least three inches. The over excavation shall be filled with earth or sand containing no material aggregate particles that would be retained on a 1/4-inch sieve. The fill material shall be compacted to approximately the same density of the adjacent soil.

### **3.1.6 Excavation for Walkways and Access Roads**

The excavation shall conform to the dimensions and elevations of the drawings applicable to areas designed for vehicular and pedestrian traffic. Subgrade areas for access roads and walkways shall be plowed, disked and moistened or aerated as required obtain proper compaction. Muck, peat and other unsatisfactory material shall be removed to a minimum depth of 12 inches below excavation grade or as required to provide a satisfactory foundation. Low areas resulting from removal of such material shall be brought up to required grade with satisfactory fill material.

### **3.1.7 Excavation of Ditches, Swales and Culverts**

Ditches, swales and culverts shall be cut accurately to the cross sections and grades indicated. The sides and bottom of ditches and swales shall conform to the slope, grade, and shape of the section indicated. Care shall be taken not to excavate ditches and swales below the grades indicated. Excessive excavation shall be backfilled to the indicated excavation depth with approved material and compacted to 90 percent maximum density. All ditches, swales, and culverts excavated under this section shall be maintained until final acceptance of the work.

### **3.1.8 Safety and Protection of Work**

Sheeting and shoring shall be done as may be necessary for the protection of the work and for the safety of personnel. The manner of bracing excavations shall comply with local regulations and OSHA construction regulations. Grading shall be performed in a manner to ensure proper drainage at all times.

### **3.1.9 Utilization of Excavated Materials**

Satisfactory excavated material shall be used in the work insofar as practicable. No excavated material shall be disposed of in such a manner as to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

### **3.1.10 Inspection of Excavated Area**

When excavations have reached the required elevations, the contractor shall not proceed with further construction of the excavated area until the area has been inspected by the Resident Engineer.

## **3.2 FILL AND BACKFILL**

### **3.2.1 Weather Conditions**

No fill or backfill operations shall be performed when weather conditions are determined by the Resident Engineer to be too wet or cold to permit such operations.

### **3.2.2 Satisfactory Material**

Material suitable for fill, backfill and embankment purposes shall be reasonably free of shale, sod, clods, and stones larger than 4 inches, organic debris, trash and frozen material. Only materials suitable for obtaining the degree of compaction specified herein shall be used.

### **3.2.3 Preparation of Surface for Fill and Embankment**

All surfaces designated to receive fill and embankment material shall be inspected prior to material placement. Soil surfaces on which compacted fill is to be placed shall be plowed, disked or otherwise broken up to a depth of 6 inches, pulverized, moistened or aerated as necessary, mixed and compacted to the same density as required for the fill or embankment material. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be stepped or benched, as directed, in such manner that the fill material will bond with the existing surface. The finished surface shall be reasonably smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtained from blade-grader operations or, where more suitable, hand raking.

### **3.2.4 Source of Fill Material**

Fill material shall be selected for the particular fill area for which it is to be used. Fill material shall not be confused with surfacing aggregate. Necessary clearing, grubbing, and disposal of debris, shall be considered incidental operations to the borrow excavation and shall be performed by the contractor. All material stockpiled on site shall either be used as fill material or disposed of by the contractor.

### **3.2.5 Fill for Slabs and Foundations**

Satisfactory material shall be placed in horizontal layers of 6 inches (loose measurement) and compacted to 95 percent maximum density. Unless directed by the Resident Engineer, no backfill shall be placed against footings prior to 7 days after footings and slabs are poured.

### **3.2.6 Backfilling of Conduit Trenches**

Trenches shall be backfilled as indicated on the drawings. Unless otherwise indicated, backfilling of the conduit trenches shall be done as follows:

- Place 4 inches of sand in the base of the trench.
- Place clean conduits on top of the sand base. Use conduit spacers (or other approved method) to maintain the required horizontal and vertical separation between conduits.
- Place sand to a level of 12 inches above the top of the conduits.
- TAMP sand.
- Place guard wire and warning tape.
- Place approximately 14" of select fill above sand (select fill shall contain no particles that would be retained on a 1 inch sieve).
- TAMP and COMPACT select fill to a minimum of 90% of maximum density in accordance with AASHTO-T-99. Compacted depth should be approximately 12" above sand.
- Place approximate 14" more of select fill.
- TAMP and COMPACT again to a minimum of 90% of maximum density.
- Place the remaining amount of select fill required and COMPACT and TAMP a third time. The finished level of the top of the trench shall not exceed 2 inches above the surrounding grade.

The disturbed area shall be cleaned, raked, and seeded. All trench backfilling shall be to the approval of the Airport Manager and the Project Engineer. THE CONTRACTOR SHALL GUARANTEE THAT NO SETTLEMENT OCCURS WHICH LEAVES A DEPRESSION BELOW THE SURROUNDING GRADE FOR A PERIOD OF ONE YEAR AFTER PROJECT COMPLETION.

### **3.2.7 Fill and Embankment for Access Roads, Walkways, and Culverts**

Fills and embankments shall be constructed at the locations and to lines and grades indicated on the drawings. The material shall be placed in successive horizontal layers of 8 inches, loose measure, for the full width of the cross section. Fills and embankments shall be compacted to 95 percent of maximum density. Final elevations after compaction shall not vary more than 0.05 feet from the established grade and approved cross section.

### **3.2.8 Fill for Open Areas**

All open areas to receive seed or sod shall be filled to within 6 inches of final grade with satisfactory material. Fill beneath this layer shall consist of material free of rocks larger than 6 inches and shall be placed in layers not greater than 8 inches, loose measure. All layers shall be compacted to 90 percent maximum density.

### **3.2.9 Placing of Crushed Rock and Topsoil**

On areas to receive crushed rock or topsoil material, the compacted fill or subgrade shall be scarified to a depth of 2 inches. Material to be placed shall then be evenly spread, graded and compacted to 90 percent of maximum density. Material required to be placed within two feet of footings or slabs shall be compacted by approved hand tampers. Compaction of topsoil to be grassed or sodded may be deferred until after seeding or sodding operations.

### **3.2.10 Compaction Methods**

Compaction shall be performed using the method and equipment suitable for the area as specified. Mechanical hand tampers shall be used only in areas adjacent to footings and slabs or in trenches or other areas where use of rollers is not practical. Compaction with pneumatic-tired rollers, three wheel power rollers, sheepsfoot rollers, etc., shall be used in all other areas as required to provide the specified compaction density.

### **3.2.11 Determination of Density**

Maximum density tests will be performed in accordance with AASHTO-T99 and field density tests will be performed in accordance with AASHTO-T191, T204, T205, or T233.

END OF SECTION

## **SECTION 02350**

### **STEEL HELICAL PIERS**

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## **SECTION 02350**

### **STEEL HELICAL PIERS**

#### **PART 1 GENERAL**

##### **1.1 DESCRIPTION**

###### **1.1.1 Scope**

The work in this section consists of furnishing and installing steel Helical Piers manufactured by the A.B. Chance Company, Centralia, Missouri.

###### **1.1.2 Design**

Unless otherwise indicated on the construction drawings, the steel Helical Piers shall be designed and installed to resist an unfactored load of 25,000 pounds.

##### **1.2 QUALITY ASSURANCE**

###### **1.2.1 Installer Qualifications**

Installation shall be done by an A.B. Chance authorized installation contractor. Proof of current certification with the A.B. Chance Company shall be submitted to the FAA Project Engineer prior to starting installation.

###### **1.2.2 Manufacturing**

Steel Helical Piers as specified shall be manufactured by a facility whose quality control systems comply with ISO (International Organization of Standard) 9001 requirements. Certificates of Registration denoting ISO Standards Number shall be presented upon request to the FAA Project Engineer.

##### **1.3 SUBMITTALS**

Submit shop drawings indicating shaft and helix sizes, and include manufacturer's catalog cuts and data sheets.

## **PART 2 PRODUCTS**

### **2.1 LISTING**

The steel Helical Piering system shall be ICBO listed. Installing contractor shall furnish evidence to the FAA Project Engineer by means of the ICBO evaluation report number ER-5110.

### **2.2 PIER SHAFTS (LEAD SECTIONS AND EXTENSIONS)**

1. The 1 ½ inch round cornered square (RCS) solid steel shafts shall conform to the general requirements of ASTM A29 and the following descriptions:
  - a. Modified medium carbon steel grade (similar to ASTM 1044) with improved strength due to fine grain size and structure having a torsional strength of 5,500 ft.-lbs., or
  - b. High strength low alloy (HSLA), low to medium carbon steel grade (similar to ASTM 1530) with improved strength due to fine grain size and structure having a torsional strength rating of 7,000 ft-lbs.
2. The 1 ¾ inch round cornered square (RCS) solid steel shafts shall conform to the general requirements of ASTM A29 and the following description:
  - a. High strength low alloy (HSLA), low to medium carbon steel grade (similar to ASTM 1530) with improved strength due to fine grain size and structure having a torsional strength rating of 10,000 ft-lbs.

### **2.3 HELICES**

Carbon steel sheet, strip, or plate formed on matching metal dies to true helical shape and shall conform the following ASTM specifications:

1. 5,500 ft.-lbs. 1 ½ inch Piers: ASTM A607, A570, or A572 80.
2. 7,000 ft.-lbs. 1 ½ inch Piers: ASTM A607, A570, or A572 80.
3. 10,000 ft.-lbs. 1 ¾ inch Piers: ASTM A715 Grade 80.

### **2.4 BOLTS**

The sizes and types of bolts used to connect the Helical Pier extensions to lead sections or another extension shall conform to the following ASTM specifications:

1. 1 ½ inch Piers: ¾ inch diameter bolt per ASTM A320 Grade L7.
2. 1 ¾ inch Piers: 7/8 inch diameter bolt per ASTM A193 Grade B7.

## **2.5 COUPLINGS**

Couplings will be formed as an integral part of (res) shaft extension material through a forging process.

## **2.6 FINISH**

All material shall have a Class B-1 hot dipped galvanized coating complying with ASTM A153.

## **PART 3 EXECUTION**

### **3.1 EQUIPMENT**

#### **3.1.1 Installation Equipment**

1. Shall be rotary type motor with equal forward and reverse torque capabilities. This equipment shall be capable of continual adjustment of the torque drive unit's revolutions per minute (RPM's) during installation. Percussion drilling equipment will not be allowed.
2. Shall be capable of applying installation torque equal to the torque required to meet the pier loads.
3. Equipment shall be capable of applying down pressure and torque simultaneously.

#### **3.1.2 Torque Monitoring Devices**

1. The torque being applied by the installation units shall be monitored throughout the installation by the installer. The torque monitoring device shall either be a part of the installing unit or an independent device in-line with the installing unit. Calibration for either unit shall be available for review by the FAA.

### **3.2 INSTALLATION PROCEDURES**

#### **3.2.1 Advancing Sections**

1. Engage and advance the Helical Pier sections in a smooth, continuous manner with the rate of pier rotation in the range of 5 to 20 RPM.
2. Apply sufficient down pressure to uniformly advance the helical sections to approximately 3-inches per revolution. The rate of rotation and magnitude of down pressure must be adjusted for different soil conditions and depths in order to maintain the penetration rate.
3. If the helical section ceases to advance, refusal will have been reached and the installation shall be terminated.



### **3.2.2 Termination Criteria**

1. The torque as measured during the installation shall not exceed the torsional strength rating of the steel helical lead and extension sections.
2. The minimum depth criteria indicated on the Drawings must be satisfied prior to terminating the steel Helical Pier.
3. The top helix is to be located not less than five (5) feet below the bottom grade. The project drawings may indicate a greater depth.
4. If the torsional strength rating of the pier and/or installing unit has been reached prior to satisfying the minimum depth required, the installing contractor shall have the following options:
  - a. Terminate the installation at the depth obtained with the approval of the FAA Project Engineer or
  - b. Remove the existing pier and install a pier with smaller and/or fewer helices. This revised pier shall be terminated at least three (3) feet beyond terminating depth of the original pier.
5. In the event the minimum installation torque is not achieved at minimum depth, the Contractor shall install the foundation deeper using additional plain extension sections.
6. The average torque for the last three feet of penetration shall be used as a basis of comparison with the minimum recommended installation torque. The average torque is the average of the last three readings recorded at one foot intervals. This average torque is intended solely as an indication of the pier's ultimate compression capacity.
7. The installer shall keep a written installation record for each Helical Pier. This record shall include the following information:
  - a. Project name and location
  - b. Name of authorized and certified dealer and installer.
  - c. Name of installer's foreman or representative witnessing the installation.
  - d. Date of installation.
  - e. Location of Helical Pier.
  - f. Description of lead section including number and diameter of helices and extensions used.

- g. Overall depth of installation from a known reference point.
- h. Installation torque at termination of pier.

END OF SECTION

## **SECTION 02505**

### **GRANULAR PAVING (ACCESS ROADS, PARKING AREAS, AND WALKWAYS)**

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## **SECTION 02505**

### **GRANULAR PAVING (ACCESS ROADS, PARKING AREAS, AND WALKWAYS)**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide the necessary materials, labor and equipment for the construction of access roads and walkways as specified herein or on applicable drawings.

#### **PART 2 PRODUCTS**

##### **2.1 MATERIALS**

The contractor shall furnish materials for access roads and walkways, and for patching the road(s) and runway/taxiway areas that meet or exceed the requirements specified herein and as shown on the drawings.

##### **2.2 AGGREGATE MATERIAL**

Unless otherwise indicated, areas designated to be crushed rock shall be at least 2 inches deep and have a maximum aggregate size of 3/4 inch. Road Base material shall meet State DOT Class 1, 5, or 6 requirements. Other gradation limits are as follows:

<u>SIEVE #</u>	<u>CLASS 1</u>	<u>% PASSING BY WEIGHT</u>	
		<u>CLASS 5</u>	<u>CLASS 6</u>
2 1/2"	100	----	----
2"	95-100	----	----
1 1/2"	----	100	----
1"	----	95-100	----
3/4"	----	----	100
#4	30-65	30-70	30-65
#8	----	----	25-55
#200	3-15	3-15	3-12

The material shall be clean and well graded. All aggregate material shall be approved by the Resident Engineer before placement.

## 2.3 ROAD STABILIZATION/WEED CONTROL FABRIC

Use Mirafi® 600X stabilization fabric (or approved equal). The fabric shall be free of any chemical treatment or coating which reduces permeability, and shall be inert to chemicals commonly found in soil. The fabric shall conform to the physical property requirements listed in the following table. All values shall represent certifiable minimum values in the weakest principle direction of the fabric.

<u>Property</u>	<u>Minimum Requirement</u>	
Weight	6.0 oz/sq.yd	(ASTM D-3776-79)
Grab Strength	300 lbs	(ASTM D-1682-64)
Grab Elongation	35% (max)	(ASTM D-1682-64)
Trapezoid Tear Strength	120 lbs	(ASTM D-1117-80)
Mullen Burst Strength	>600 psi	(ASTM D-3786-80)
Puncture Strength	130 lbs	(ASTM D-3787-80)
Thickness	30 mils	(ASTM D-1777-64)
Water Flow Rate	50 gal/min/sf	(CFMC GET-2)

Fabric width shall be 12.5 feet. Fabric in other areas shall be cut to fit, and overlapped to fully cover such areas.

## 2.4 SOIL STERILANT

Use water-soluble liquid herbicide such as Hyvar X-L by Dupont (or approved equal). Active ingredient: Lithium salt of bromacil - 21.9%.

## PART 3 EXECUTION

### 3.1 PREPARATION OF GROUND SURFACE

Areas designated for access roads, walkways, and graveled areas shall be scarified to a depth of 4" (unless otherwise specified) and compacted to 90 percent of maximum density in accordance with AASHTO-T99.

### 3.2 SURFACING

Surfacing shall only be done when the ground surface is dry and unfrozen. Placement shall be made to the line and grade shown on the applicable drawings and as staked by the contractor. Compaction shall be performed with a steel wheel tandem or 3-wheel roller not weighing less than eight tons or a method satisfactory to the Resident Engineer.

### 3.3 PLACEMENT OF ROAD STABILIZING/WEED CONTROL FABRIC

The fabric shall be installed on the prepared subgrade rolled out directly upon the prepared surface and shall not be dragged over any surface. Fabric in place shall have a smooth surface

and shall be free of folds, wrinkles, cuts, or other imperfections. Individual panels of fabric shall be overlapped 18 inches minimum with the preceding layer overlapping the following layer in the direction that surfacing material will be spread. No vehicular traffic will be permitted directly upon the fabric.

### **3.4 AGGREGATE PLACING**

Aggregate surfaced roads, walkways, parking areas, and turn around areas, shall consist of a minimum of 2 inches deep compacted crushed rock (3/4" max aggregate) unless otherwise shown on the Project Drawings. Aggregate shall be compacted by roller.

### **3.5 COMPACTION AND GRADING**

Compaction shall closely follow the spreading operation to prevent loss of contained moisture or displacement of materials. Any irregularities or depressions that develop in the layers under rolling operations shall be corrected by loosening the material and removing or adding aggregate and re-rolling. The rolling shall be continued until the surface is shown to be smooth and uniform, and to such trueness that when tested with a 10-foot straightedge it shall not show any deviation in excess of 1/4-inch. At all places not accessible to the roller, the aggregate of each layer shall be tamped separately and compacted to grade and line with mechanical tampers.

If any subgrade material is worked into the aggregate material during the compacting or finishing operations, all granular material within the affected areas shall be removed and replaced with new aggregate. The Resident Engineer may restrict hauling or traffic over the completed or partially completed base after inclement weather or at any time when the subgrade is soft, and there is a tendency for the subgrade material to work into the base material.

Compaction requirements are 95 percent maximum density as determined by AASHTO T 180. Compaction shall continue until no further discernible compaction is evidenced under action of the compaction equipment.

### **3.6 PLACEMENT OF SOIL STERILANT**

Water-soil liquid soil sterilant (herbicide) shall be applied to all finished roads, walkways, parking areas, and areas where crushed rock was installed. Apply herbicide per the manufacture's instructions.

### **3.7 QUALITY ASSURANCE**

#### **3.7.1 Testing**

Compaction testing shall be arranged by the contractor and performed by an independent testing company (in the presence of the Resident Engineer) at the expense of the contractor. If these tests show that the compaction is less than specified, the contractor shall correct the situation and be responsible for all associated cost.

### **3.7.2 Certification**

The contractor shall furnish a certificate that all materials, compositions, densities and mixtures to be used in the construction of access roads and walkways meet local or state requirements. The contractor shall provide the Resident Engineer, at the time of delivery, two copies of the aggregate delivery ticket or bituminous concrete delivery ticket. The tickets shall indicate the delivery date, time dispatched, name and location of the project, name of contractor, name of supplier, truck number, quantity and composition of job mix formula.

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## **SECTION 02930**

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## **SECTION 02930**

### **SEEDING**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

All seeded areas disturbed by the contractor shall be restored to its original condition. The work covered by this section consists of furnishing all labor, materials, tools, equipment, plant and services necessary to complete the portion of site work including topsoil placement, sodding and planting specified herein and as shown on the applicable drawings.

#### **PART 2 PRODUCTS**

##### **2.1 FERTILIZER**

A commercial fertilizer, uniform in composition, free flowing and suitable for spreading with approved equipment shall be used. Fertilizer shall be not less than 40 pounds nitrogen and 40 pounds phosphorus per acre.

##### **2.2 SEED**

New seed shall be applied so that the resulting growth results in a turf that matches the undisturbed surrounding areas. The exact seeding mixture shall be obtained from and approved by the Airport.

#### **PART 3 EXECUTION**

##### **3.1 PREPARATION OF GROUND & SEEDING**

Areas to be seeded shall be raked or otherwise cleared of stones larger than 3" in diameter, sticks, and other debris which might interfere with sowing of seed and growth of grasses. Following preparation, fertilizer shall be uniformly spread over the entire area to be seeded. Immediately after fertilizing the seed shall be sown at the specified rate and the seed shall be raked in 1/2 to 3/4 inch.

##### **3.2 MAINTENANCE AND REPAIR**

The contractor shall maintain seeded and sodded areas until the Contractor Acceptance Inspection. Maintenance shall consist of watering and mowing operations and protecting such areas from traffic. Repair shall consist of reestablishing seed or sod areas damaged by traffic, erosion, drought, fire, or water. Such areas shall be re-sodded or re-seeded in accordance with this specification or as directed by the Resident Engineer until a satisfactory growth is obtained.

END OF SECTION

**SECTION 03100**  
**CONCRETE FORMWORK**

**TABLE OF CONTENTS**

**GENERAL**

1.1                      GENERAL

**PRODUCTS**

2.1                      FORMS  
2.2                      CYLINDRICAL CONCRETE PIERS  
2.3                      FORM TIES  
2.4                      FORM OIL

**EXECUTION**

3.1                      FORM WORK PLACEMENT  
3.2                      FORM CURING  
3.3                      FORM REMOVAL

## **SECTION 03100**

### **CONCRETE FORMWORK**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide all labor, equipment and materials as required to locate and place concrete forms specified herein or on applicable drawings.

#### **PART 2 PRODUCTS**

##### **2.1 FORMS**

Forms shall be wood, plywood, metal or other approved material. The contractor may use prefabricated forms for cylindrical foundations if indicated on the applicable drawings. All form materials shall be of the grade or type suitable to obtain the kind of finish specified.

##### **2.2 CYLINDRICAL CONCRETE PIERS**

All cylindrical concrete piers, if required, shall be formed to a depth of two feet minimum. Use approved cylindrical forms.

##### **2.3 FORM TIES**

Form ties shall be either fixed band type or threaded internal disconnecting type with a working load suitable to prevent deformation of forms. They shall be of the type as to leave no metal closer to the surface than 1/2 inches for steel ties and 1 inch for stainless steel ties. Twisted wire ties shall not be permitted.

##### **2.4 FORM OIL**

Form oil shall be nonstaining and shall not cause softening of the concrete or impede the wetting of surfaces to be cured with water or curing compounds.

#### **PART 3 EXECUTION**

##### **3.1 FORMWORK PLACEMENT**

Formwork shall not be placed prior to inspection, testing or approval of the excavated area and imbedded items by the Resident Engineer. Forms shall result in a final structure which does not exceed +1/2 inch variation in any dimension shown on the applicable drawings. Form joints shall

be sufficiently tight to prevent leakage of mortar. Form oils shall be placed on forms or form ties and shall be removed from reinforcing steel or conduits if accidentally applied to such.

### **3.2 FORM CURING**

In hot, dry climates, wood forms remaining in place shall not be considered adequate curing, but shall be loosened so that the concrete surfaces may be cured in accordance with 3-3.6.

### **3.3 FORM REMOVAL**

Forms shall not be removed until concrete has attained at least 30 percent of the specified 28-day compressive strength.

END OF SECTION

## **SECTION 03200**

### **CONCRETE REINFORCEMENT**

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- 1.1 GENERAL
- 1.2 REFERENCES
  - 1.2.1 American Society for Testing and Materials (ASTM)
  - 1.2.2 American Concrete Institute (ACI) Standards

##### **PRODUCTS**

- 2.1 REINFORCING STEEL
- 2.2 TIE WIRE, CHAIRS, AND SPACERS

##### **EXECUTION**

- 3.1 REINFORCEMENT SURFACES
- 3.2 BENDING
- 3.3 HOOKS
- 3.4 PLACING REINFORCEMENT
- 3.5 QUALITY ASSURANCE

## **SECTION 03200**

### **CONCRETE REINFORCEMENT**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide the necessary labor, materials and equipment for the placement of steel reinforcement as specified herein and shown on the applicable drawings.

##### **1.2 REFERENCES**

The following specifications and standards of the issues currently in force, form a part of this section and are applicable as specified herein.

###### **1.2.1 American Society for Testing and Materials (ASTM)**

ASTM A 615 - Deformed Billets Steel Bars for Conc. Reinforcement

ASTM A 185 - Welded Wire Fabric for Concrete Reinforcement

###### **1.2.2 American Concrete Institute (ACI) Standards**

ACI 315 - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures

## **PART 2      PRODUCTS**

### **2.1 REINFORCING STEEL**

Reinforcing steel shall be new, clean, undamaged, and unless otherwise indicated, conforming to ASTM A-615, grade 60.

### **2.2 TIE WIRE, CHAIRS, AND SPACERS**

All devices necessary to properly space, support and fasten steel reinforcement in place during concrete placement shall conform to ACI 315. Tie wire shall be 16 gauge or larger annealed iron wire.

## **PART 3      EXECUTION**

### **3.1 REINFORCEMENT SURFACES**

Steel reinforcement shall be free of mud, oil or other nonmetallic coatings which may affect bonding quality. Mill scale or rust remaining after hand brushing with a wire brush is permissible.

### **3.2 BENDING**

All bends in bars and ties shall be cold bent. No bends shall be made in bars or ties partially embedded in concrete.

### **3.3 HOOKS**

Hooks indicated shall be 180 degree hooks. The bend diameter as measured on the inside of the bar shall be not less than 6 bar diameters for bars and not less than 1-1/2 inches for #3 ties.

### **3.4 PLACING REINFORCEMENT**

Steel reinforcement shall be accurately placed at the spacing and in the sizes indicated on the applicable drawings and secured against displacement during the pour operations. Reinforcement shall be placed within +1/2 inch of the indicated dimensions.

### **3.5 QUALITY ASSURANCE**

Two copies of mill certificates of steel compliance with ASTM A 615 shall be submitted to the Resident Engineer at the time of site delivery. The certificate shall be signed by an authorized officer of the contractor, and shall include the project name and location, and the quantity and delivery date to which the certificate applies.

END OF SECTION

## **SECTION 03300**

### **CAST-IN-PLACE CONCRETE**

#### **TABLE OF CONTENTS**

##### **GENERAL**

- 1.1 GENERAL
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  - 1.2.1 American Society for Testing and Materials (ASTM)
  - 1.2.2 American Concrete Institute (ACI) Specification
- 1.3 SUBMITTALS

##### **PRODUCTS**

- 2.1 CEMENT
- 2.2 AGGREGATES
- 2.3 WATER
- 2.4 ADMIXTURES
- 2.5 QUALITY
  - 2.5.1 Slump
  - 2.5.2 Strength
  - 2.5.3 Air Content
  - 2.5.4 Proportions
- 2.6 EXPANSION JOINT FILLER
- 2.7 EXPANSION JOINT SEALANT

##### **EXECUTION**

- 3.1 MIXING AND PLACING CONCRETE
  - 3.1.1 Site Preparation
  - 3.1.2 Mixing
  - 3.1.3 Conveying
  - 3.1.4 Depositing
  - 3.1.5 Cylindrical Concrete Piers
  - 3.1.6 Consolidation
  - 3.1.7 Finish
- 3.2 CURING
- 3.3 ANCHOR BOLTS, PLATES, AND COUPLINGS
  - 3.3.1 Anchor Bolts and Plates
  - 3.3.2 Embedded Couplings
- 3.4 QUALITY ASSURANCE
  - 3.4.1 Testing
  - 3.4.2 Concrete Certification
- 3.5 REPAIR AND REPLACEMENT



## **SECTION 03300**

### **CAST-IN-PLACE CONCRETE**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide the necessary materials, labor and equipment for the placement of concrete as specified herein and shown on applicable drawings.

##### **1.2 REFERENCES**

The following specifications and standards of the issues currently in force, form a part of this section and are applicable as specified herein.

##### **1.2.1 American Society for Testing and Materials (ASTM) Specifications**

ASTM C 33 Specifications for Concrete Aggregates  
ASTM C 94 Specifications for Ready-Mixed Concrete  
ASTM C 143 Slump of Portland Cement Concrete  
ASTM C 150 Specification for Portland Cement  
ASTM C 231 Air Content of Freshly Mixed Concrete by the Pressure Method  
ASTM C 260 Specification for Air-Entraining Admixtures for Concrete  
ASTM C 494 Specification for Chemical Admixtures for Concrete

##### **1.2.2 American Concrete Institute (ACI) Specification**

ACI 211.1 - Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete

##### **1.3 SUBMITTALS**

Provide certification signed by material producer and contractor that all materials and mix compositions comply with the specified requirements.

#### **PART 2 PRODUCTS**

##### **2.1 CEMENT**

All cement shall conform to ASTM C 150, Type I or Type III as indicated on the drawings.

## **2.2 AGGREGATES**

Aggregate shall conform to ASTM C 33 except that maximum aggregate size shall be 3/4-inch.

## **2.3 WATER**

Water used in mixing and curing operations shall be clean, and free from oils, acids, organic matter and chemical suspensions which may adversely affect cure times, strength requirements or service life of the concrete.

## **2.4 ADMIXTURES**

Air entraining admixtures shall conform to ASTM C 260. Admixtures used for water-reducing and retarding shall conform to ASTM C 494, Type A or Type D.

## **2.5 QUALITY**

### **2.5.1 Slump**

The concrete shall have a slump of 3 to 4 inches.

### **2.5.2 Strength**

Unless otherwise indicated on the construction drawings, Type I concrete shall have a 28 day compressive strength of 3,000 psi and Type III shall have a 7 day compressive strength of 3,000 psi.

### **2.5.3 Air Content**

Air entraining for all concrete shall be 4 to 8 percent.

### **2.5.4 Proportions**

Concrete materials shall be proportioned in accordance with ACI 211.1 for site mixed concrete and ASTM C 94 for ready mixed concrete.

## **2.6 EXPANSION JOINT FILLER**

Use flexible foam expansion joint filler such as Ceramar by W.R. Meadows, Inc. (or approved equal). Product shall meet the requirements of ASTM D 1752, Sections 5.1 through 5.4 with the compression requirement modified to 10 psi minimum and 25 psi maximum and shall be compatible with hot-pour joint sealers.

## **2.7 EXPANSION JOINT SEALANT**

Use one-part self-leveling polyurethane sealant such as Sonolastic SL1 by Sonneborn (or approved equal). Product shall comply with Federal Specification TT-S-00230C, Type 1 Class A; ASTM C 920, Type S, Grade P, Class 25, Use T, M.

## **PART 3 EXECUTION**

### **3.1 MIXING AND PLACING CONCRETE**

#### **3.1.1 Site Preparation**

Prior to placing concrete all areas to receive concrete shall be inspected and approved by the Resident Engineer. Concrete shall not be deposited on muddy or frozen material. All surfaces to be in contact with the concrete shall be wetted.

#### **3.1.2 Mixing**

All mixers used for ready mix or site mix operations shall be cleaned prior to material recharge. The area of operation of the mixers shall be such as to not endanger existing structures or excavations. All concrete shall be mixed until there is a uniform distribution of materials. Concrete having attained initial set or having contained water for more than 90 minutes shall not be used in the work.

#### **3.1.3 Conveying**

Concrete shall be conveyed from the mixer to the deposit site by equipment which will prevent separation or loss of material and which will ensure a nearly continuous flow of material at the deposit site.

#### **3.1.4 Depositing**

Concrete shall be placed in such a manner as to prevent displacement of forms or reinforcement. Placing shall be stopped if contamination due to sloughing occurs until the contaminant can be removed. In the case of form or reinforcement displacement, placing may be continued only if the displacement is corrected within specified tolerances. The placing of concrete shall be a continuous operation at each deposit site and shall be completed within 1-1/2 hours after the addition of water. Concrete shall be deposited in 12 to 18 inch layers as level as possible prior to consolidation operations. Under no circumstances shall fresh concrete be placed over concrete that is no longer plastic. Time between placements at each deposit site shall not exceed one hour for regular mixes and two hours for retarded mixes.

### **3.1.5 Cylindrical Concrete Piers**

Tops of piers shall be furnished flat within the confines of the Sonotube forms. Unless otherwise approved, the edges shall have a 1/2" or 3/4" radius. No spillage (mushrooming) over the tops of forms will be allowed.

### **3.1.6 Consolidation**

Consolidation of concrete during and after placing shall be performed using an internal vibrator with a vibration frequency not less than 150 hertz. Each layer shall be consolidated so that concrete is thoroughly worked around reinforcement, embedded items and forms. Vibrators shall penetrate about 6 inches into underlying layers to ensure proper union of the layers. Movement of the vibrator over the layer shall be such as to ensure uniform plasticity without pooling of cement.

### **3.1.7 Finish**

After the concrete has been placed and consolidated, the surface shall be screed with straight edges, floated, and troweled to the required finish level. All concrete surfaces shall have a smooth finish except for exposed top surfaces which shall have a broom finish. Broom lines shall be straight and parallel to the form edges and well defined. Unless otherwise indicated on the drawings, the foundation surface shall be level +/- 1/8" and all exposed edges shall be chamfered 1 inch (1/2" or 3/4" radius on circular tops). A NEAT, CLEAN, PROFESSIONAL CONCRETE FINISH IS REQUIRED! Concrete not meeting this requirement shall be completely removed and replaced at the contractor's expense.

Apply a Concrete Curing Compound (SealMaster or as approved) as directed by the manufacturer and as approved. Concrete Curing Compound should generally be applied once the concrete is firm enough to walk on with no surface water present (about one hour after final trowelling or when application will not mar surface).

## **3.2 CURING**

Concrete shall be maintained above 50 degrees F and less than 120 degrees F and in a moist condition during the cure period. The cure period shall be 7 days when Type I Portland cement is used and 3 days when Type III Portland cement is used. Exposed surfaces shall be covered with burlap, cotton, or other approved fabric or sand. If air temperatures are expected to exceed 75 degrees F, water curing shall be continuous and forms shall be loosened as soon as the concrete has set sufficiently to prevent damage. In conditions where air temperature may be expected to fall below 40 degrees F, equipment and covering to maintain a 50 degree concrete temperature shall be provided. Salt or other chemicals to prevent freezing shall not be permitted.

### **3.3 ANCHOR BOLTS, PLATES, AND COUPLINGS**

#### **3.3.1 Anchor Bolts and Plates**

Anchor bolts shall be installed in concrete prior to the concrete setting and at a time and manner to assure that there is no voids around the bolts. Anchor bolts and plates shall be set level and plumb, and within a tolerance necessary for their proper alignment and to the structure support. Flanges and anchors shall be set level and plumb, and within a tolerance necessary for their proper alignment and to the frangible structure they support. All bolts and other hardware shall be hot-dipped galvanized and shall be contractor furnished (unless otherwise indicated to be government furnished).

#### **3.3.2 Embedded Couplings**

Couplings embedded in concrete shall be installed so that the top of the coupling is flush with the top of concrete and conduits to be extended from the coupling are level and plumb. Foundations with embedded couplings that do not meet this requirement shall be removed and re-installed at the contractors expense.

### **3.4 QUALITY ASSURANCE**

#### **3.4.1 Testing**

Testing for the concrete shall be arranged by the contractor and performed by an independent testing company (in the presence of the Resident Engineer) at the expense of the contractor. If these tests show concrete strength less than specified, the contractor shall correct the situation and be responsible for all associated cost.

#### **3.4.2 Certification**

The contractor shall furnish a certificate that all materials, compositions, densities and mixtures to be used meet local or state requirements. The contractor shall provide the Resident Engineer with a delivery ticket (batch ticket) for ready mix concrete from the concrete supplier at the time of each delivery which certifies compliance with material and quality requirements specified herein. The tickets shall indicate the delivery date, time dispatched, name and location of project, name of contractor, name of concrete producer, truck number, quantity, air content, admixtures and design strength of the concrete delivered.

### **3.5 REPAIR OR REPLACEMENT**

The contractor shall restore concrete damaged by work under this contract to its original condition as directed by the Resident Engineer. The Resident Engineer shall reject any fresh concrete not meeting slump or air entrainment requirements. Any concrete not meeting strength requirements shall be removed and replaced by the contractor. Any repair or replacement costs shall be paid by the contractor.

END OF SECTION

***DIVISION 16000***

***ELECTRICAL***

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**GENERAL**

- 1.1 GENERAL
- 1.1.1 Workmanship
- 1.1.2 Interpretation of Drawings
- 1.1.3 Rules
- 1.1.4 Coordination
- 1.2 REFERENCES
- 1.2.1 National Fire Protection Association (NFPA) Publications
- 1.2.2 F.A.A. Specifications and Standards

**PRODUCTS**

Not Used

**EXECUTION**

Not Used

## ***DIVISION 16000***

### ***ELECTRICAL***

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

This section covers the requirements for electrical work complete. The work covered under this section consists of furnishing all labor, tools, equipment and material to install the electrical work shown on the drawings and/or described by these specifications.

###### **1.1.1 Workmanship**

All electrical installation work shall be performed by experienced electricians regularly engaged in this type of work and properly licensed when required. All materials and equipment shall be installed in conformance with the contract documents, and in accordance with recommendations of the manufacturer as approved by the Resident Engineer.

###### **1.1.2 Interpretation of Drawings**

In general, the drawings utilize accepted diagrammatic symbolism to indicate electrical construction work. This symbol does not have any dimensional significance. The layout of wiring, circuits, outlets, and equipment is developed as an engineering aid and should not be interpreted as a release from responsibility for installing the work without space conflict, but all work shall be installed in accordance with the diagrammatic intent of the drawings.

###### **1.1.3 Rules**

The installation shall conform to this specification, the contract drawings and to the applicable requirements of the National Electrical Code, local code, or FAA standards. In cases where regulations and/or contract documents are conflicting or discrepancies occur, the more stringent requirement shall be followed and enforced.

###### **1.1.4 Coordination**

It is the responsibility of the contractor to totally familiarize himself/herself with the scope of the work involved and to coordinate his work with the other trades and personnel involved with the job site.

##### **1.2 REFERENCES**

The issues currently in force of the following specifications and standards form a part of this section, and are applicable as specified herein:



### **1.2.1 National Fire Protection Association (NFPA) Publications**

No. 70          National Electrical Code

No. 78          Lightning Protection Code

### **1.2.2 FAA Specifications and Standards**

UNLESS OTHERWISE INDICATED, THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING FAA SPECIFICATIONS AND STANDARDS:

FAA-C-1217f          Electrical Work, Interior

FAA-C-1391b          Installation and Splicing of Underground Cables

FAA-STD-019e          Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment.

### **PART 2          PRODUCTS**

Not Used

### **PART 3          EXECUTION**

CONTRACTORS SHALL IMMEDIATELY NOTIFY THE FAA OF ANY CONFLICTS THAT EXIST WITHIN THE CONTRACT DOCUMENTS AND BETWEEN THOSE DOCUMENTS AND THE RULES, REGULATIONS AND CODES OF THE LOCAL UTILITY COMPANY AND LOCAL COUNTY OR STATE GOVERNING BODIES. IN CASES WHERE REGULATIONS AND/OR CONTRACT DOCUMENTS ARE CONFLICTING OR DISCREPANCIES OCCUR, THE MORE STRINGENT REQUIREMENT SHALL BE FOLLOWED AND ENFORCED.



FEDERAL AVIATION ADMINISTRATION  
AIR TRAFFIC ORGANIZATION  
WESTERN SERVICE AREA  
TECHNICAL OPERATIONS  
ENGINEERING SERVICES  
NAVAIDS ENGINEERING GROUP

# PRECISION APPROACH *P*ATH INDICATOR

## SERVING RUNWAY 12

### AT THE

### ELY AIRPORT

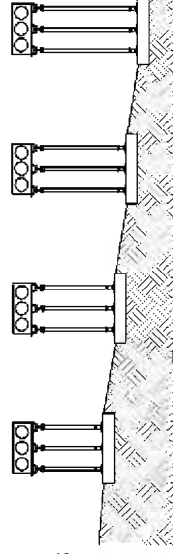
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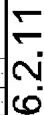
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#### LIST OF DRAWINGS

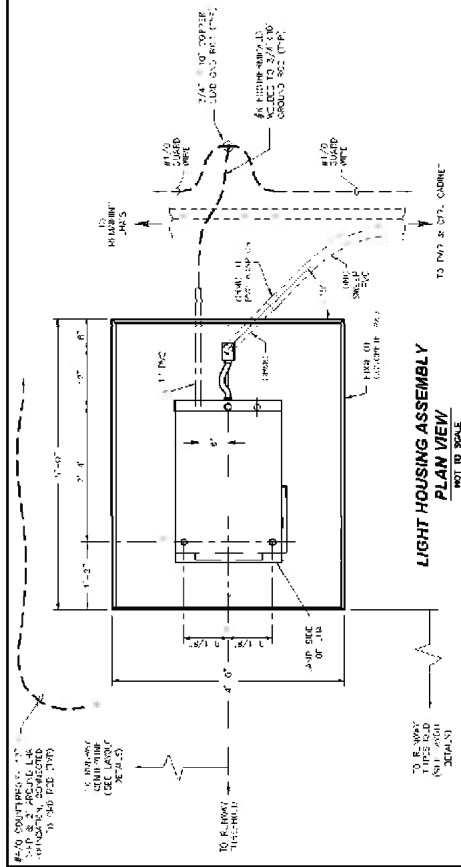
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ELY-B-PAPI12-G006  
ELY-B-PAPI12-G007

VICINITY LAYOUT  
LAYOUT DETAILS  
LHA, INSTALLATION DETAILS  
POWER AND CONTROL STATION, INST DTL'S  
HELICAL PIER FOUNDATION DETAILS  
SYSTEM WIRING DIAGRAM  
ASPHALT ROAD

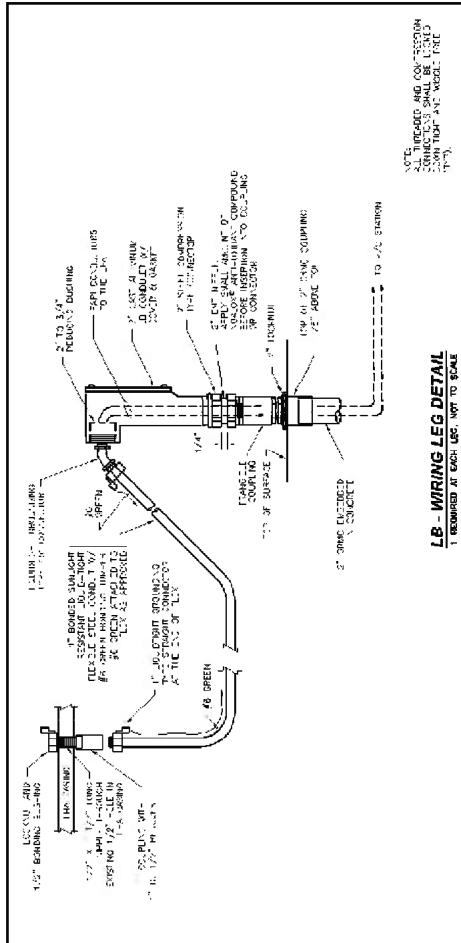




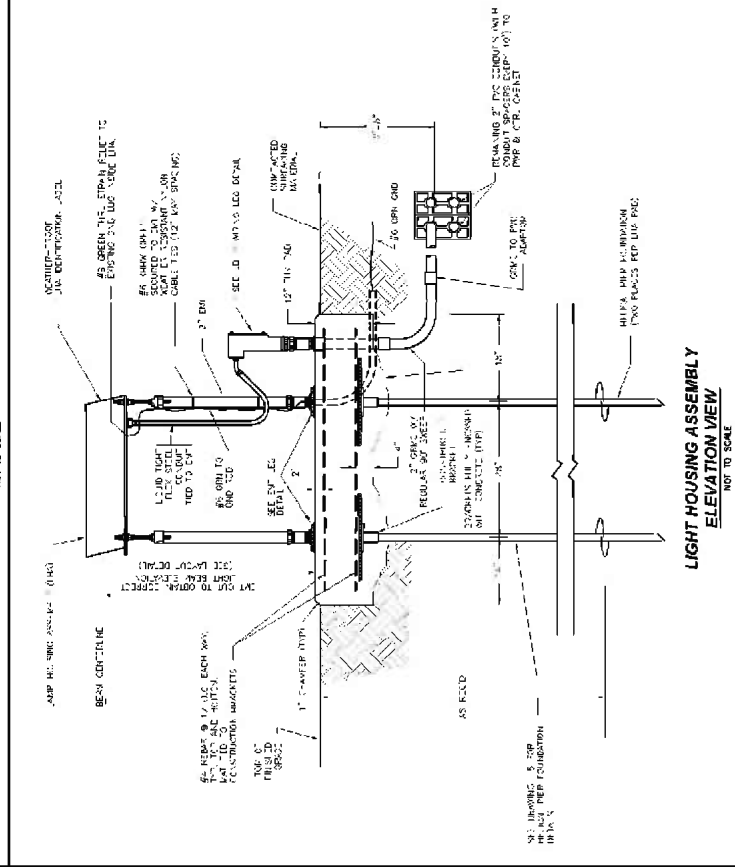




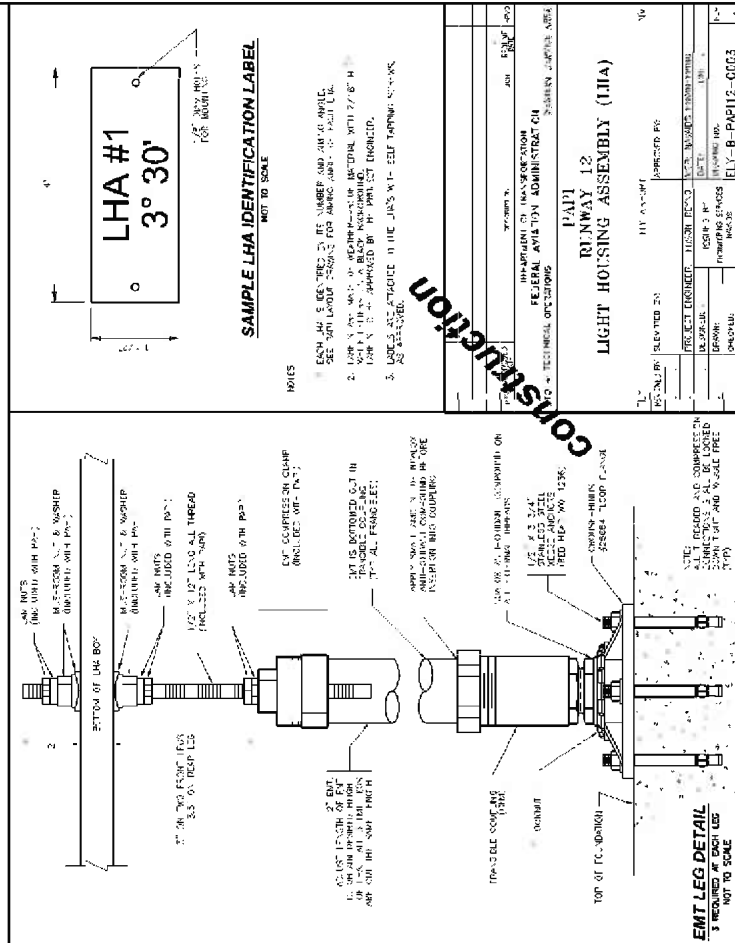
**LIGHT HOUSING ASSEMBLY**  
**PLAN VIEW**  
NOT TO SCALE



**LB - WIRING LEG DETAIL**  
REQUIRED AT EACH LRG, NOT TO SCALE



**LIGHT HOUSING ASSEMBLY  
ELEVATION VIEW**



**EMT LEG DETAIL**  
3 REQUIRED AT EACH LEG

**SAMPLE LHA IDENTIFICATION LABEL**

NOTES

1. EACH JAR IDENTIFIED BY ITS NUMBER AND DATE OF ANALYSIS. SEE THE FOLLOWING SCHEDULE FOR ANALYSIS OF EACH JAR.
2. 1 LITER JARS MAY BE WEIGHED—AS IS—INSTEAD OF 77.6% H<sub>2</sub>O. 500 ML JARS MAY BE WEIGHED IN BLACK BACKGROUND.
3. JARS MAY BE APPROVED BY THE LAB SET FURNISHED.
4. JARS MAY BE APPROVED BY THE LAB SET FURNISHED.

DATE	10/1/73	TIME	10:00 AM
TO	HONORABLE CHAIRMAN, HOUSE SELECT COMMITTEE ON ASSASSINATIONS		
FROM	HONORABLE CHAIRMAN, HOUSE SELECT COMMITTEE ON ASSASSINATIONS		
SUBJECT	RE: HONORABLE CHAIRMAN, HOUSE SELECT COMMITTEE ON ASSASSINATIONS		
REMARKS	RE: HONORABLE CHAIRMAN, HOUSE SELECT COMMITTEE ON ASSASSINATIONS		
INITIALS	[Signature]		
DATE	10/1/73		

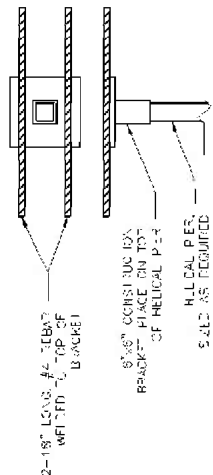
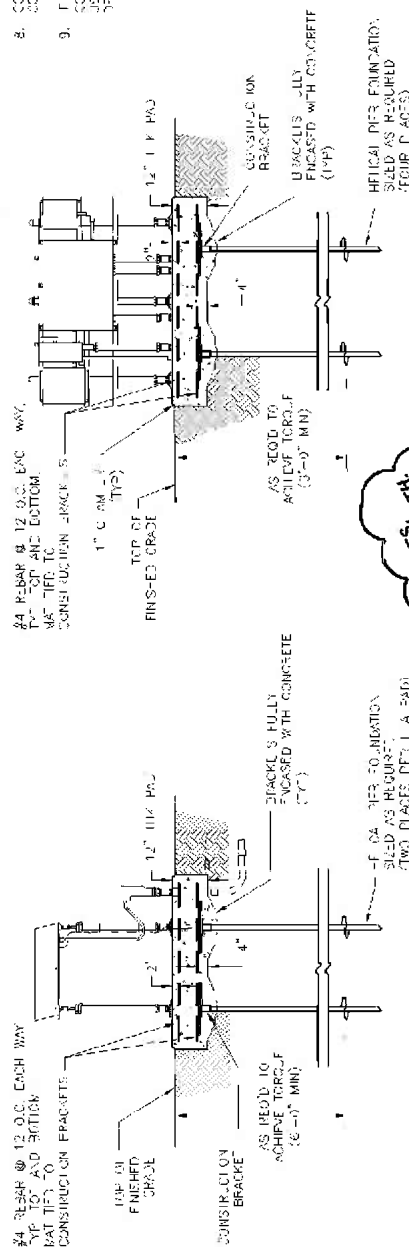
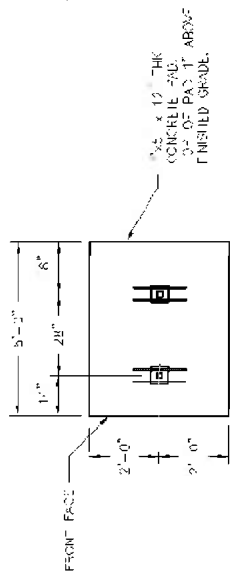
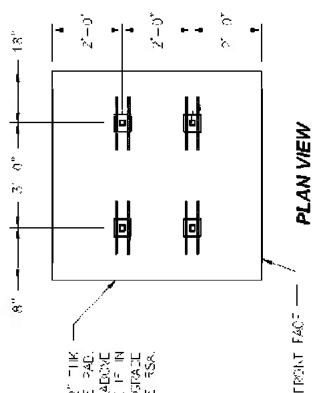


LEGAL PRACTICES

- 1- HELIX PERS LEAD SPLICING IS ENCOURAGED. EXHAUSTION UNITS ARE MANUFACTURED BY AEROSPACE COMPANY, CINCINNATI, MO. (673-987-6414).
- 2- HELIX PERS SUPPLIED AND INSTALLED BY A CONTRACTOR TRAINED AND CERTIFIED AS AN INSTALLER BY THE PER MANUFACTURER.
- 3- HELIX PERS ARE SIZED AND INSTALLED TO RESIST AN UNFACTORED DESIGN LOAD OF 250 LBS/SQ FT MINUS JOINTS, JUNCTIONS & CORRELATIONS.
- 4- CURB, STAIR FLIPS AND EXTENSIONS ARE 1/2" HGT WALL-ROUND CORNERS, SQUARE PERS) SOLD STEEL RAILS MEETING DIMENSIONAL AND WORKMANSHIP REQUIREMENTS. ALL ASTM A36, 1/4" DIA. SS-ALL JOINTS-REDUCED CARBON STEEL GRADE (SIMILAR TO AISI 304) WITH IMPROVED STRENGTH DUE TO FINE GRAIN PROCESSING-TENSILE STRENGTH = 5,500 PSI YIELD STRENGTH = 30,000 PSI MINIMUM WELD 3/8 INCH - 70 PSI
- 5- HELIX PERS ARE INSTALLED IN A SMOOTH CONTINUOUS MANNER, AND IN FULL COMPLIANCE WITH THE MANUFACTURER'S RECOMMENDED INSTALLATION.

3-  
CROUF STR=NGT- RA=NG = 4.500 FT E  
MINIMUM WELD STRENGTH = 70 KSI

2. HELIX PIER IS TO BE INSTALLED IN A SMOOTH CONTINUOUS MANNER AND IN FULL COMPLIANCE WITH THE MANUFACTURER'S RECOMMENDED PROCEDURES.
3. HELIX PIER IS TO BE VERTICAL WITH A MAXIMUM DEVIATION OF 2°.
4. A RECORD OF PIER INSTALLATION SHOULD BE SUBMITTED TO THE LAW PROJECT ENGINEER. SHOW THE NAME OF AUTHORIZED DESIGNER AND INSTALLER, ASSIGN EACH PIER A NUMBER FROM 1 TO 100,000,000. THE TYPE OF INSTALLATION, DEPTH OF EACH SECTION OF EACH PIER, AND THE TYPE OF INSTALLATION, DEPTH OF EACH SECTION INCLUDING UNDER AND DIAMETER OF PILES AND EXTENSIONS USED, OVERALL DIAPHRAGMS ALLOWED (BELLOW GRADE), AND THE CHUING INSTALLATION PILES.
5. CONTRACTOR IS ENCOURAGED TO INSTALL ONE OR MORE TEST PIER TO DETERMINE SITE CONDITIONS.
6. THE REQUIREMENTS FOR HELIX PIERS CAN NOT BE MET BECAUSE OF SOIL CONDITIONS, ROCKS, ETC., THEN TYPICAL BLOCK AND PIER FOUNDATIONS MUST BE USED. CONCRETE BLOCKS SHALL BE THE SURFACE DIMENSIONS SHOWN AND SHALL BE 100% FULL DEPTH WITH NO DEFECTS, AS APPROVED.



### CONSTRUCTION BRACKET DETAIL

[illegible]

**PAPI POWER & CONTROL STATION  
HELICAL PIER FOUNDATION DETAIL**

**PAPILHA PAD  
HELICAL PIER FOUNDATION DETAIL**

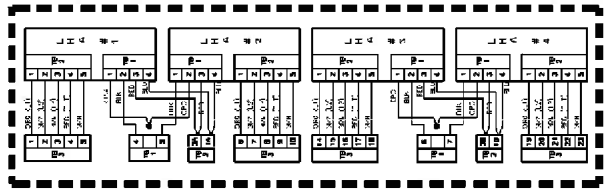
MEMBERED CONDUITS NOT SHOWN NOT TO SCALE

31823

FOR BIDDING PURPOSES,  
ASSUME 1/2" HELICAL PIER DEPTH.  
THEN PROVIDE PRICE FOR  
ADDITIONAL FOOT

1. ALL ELECTRICAL WORK DONE WHILE HE IS COMPLAINTS UNIT - THE 575 0508 FOR 10-10-71 AND THE 1502.
2. UNITS OF CLOTHES REMOVED, ALL CLOTHING, ETC. A. AND A. HEMPHILL AND A. HEMPHILL, JR. WERE CALLED TO THE SCENE. THE 575 0508 FOR 10-10-71 AND THE 1502.
3. UNITS OF CLOTHES REMOVED, ALL CLOTHING, ETC. A. AND A. HEMPHILL AND A. HEMPHILL, JR. WERE CALLED TO THE SCENE. THE 575 0508 FOR 10-10-71 AND THE 1502.
4. UNITS OF CLOTHES REMOVED, ALL CLOTHING, ETC. A. AND A. HEMPHILL AND A. HEMPHILL, JR. WERE CALLED TO THE SCENE. THE 575 0508 FOR 10-10-71 AND THE 1502.
5. UNITS OF CLOTHES REMOVED, ALL CLOTHING, ETC. A. AND A. HEMPHILL AND A. HEMPHILL, JR. WERE CALLED TO THE SCENE. THE 575 0508 FOR 10-10-71 AND THE 1502.
6. UNITS OF CLOTHES REMOVED, ALL CLOTHING, ETC. A. AND A. HEMPHILL AND A. HEMPHILL, JR. WERE CALLED TO THE SCENE. THE 575 0508 FOR 10-10-71 AND THE 1502.

- [illegible]



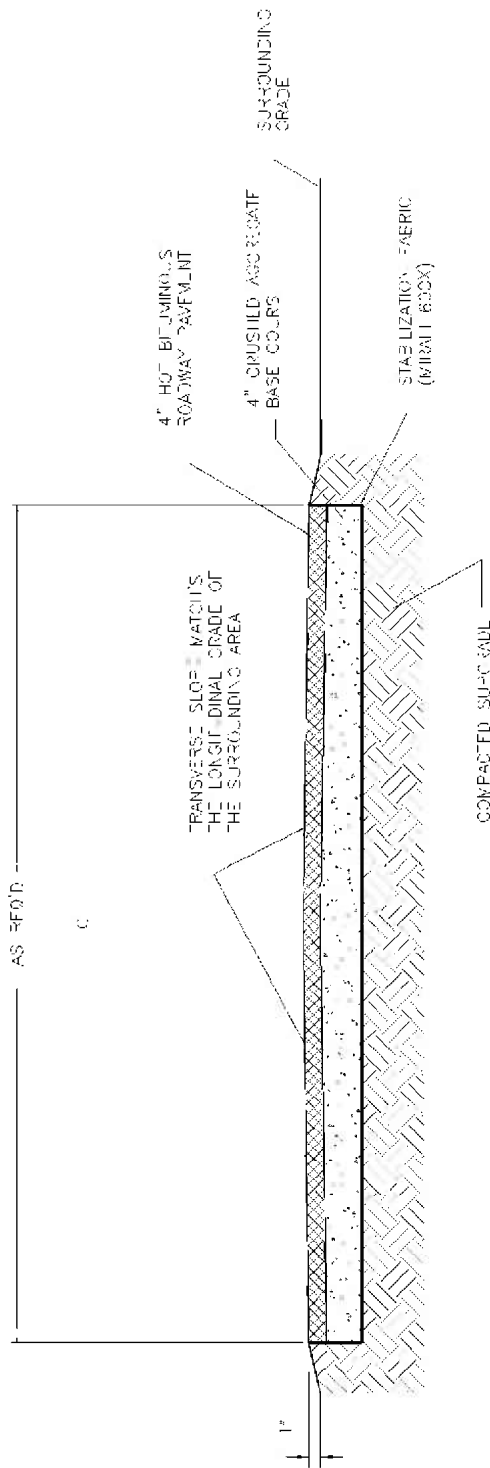
SIMPLIFIED TERMINATION DIAGRAM  
LH4'S TO PWR & CTRL CABINET

UNION  
FEDERATION  
- TECHNICAL DEPARTMENT  
SYSTEM

# PAIPI RUNWAY 12 SYSTEM WIRING DIAGRAM

DATE	10-20-16	DATE	10-20-16
TIME	10:30 AM	TIME	10:30 AM
LOCATION	1000 S. 10th St. #100	LOCATION	1000 S. 10th St. #100
OFFICER	1000 S. 10th St. #100	OFFICER	1000 S. 10th St. #100
REPORT	1000 S. 10th St. #100	REPORT	1000 S. 10th St. #100
REMARKS	1000 S. 10th St. #100	REMARKS	1000 S. 10th St. #100
INITIALS	1000 S. 10th St. #100	INITIALS	1000 S. 10th St. #100
SIGNATURE	1000 S. 10th St. #100	SIGNATURE	1000 S. 10th St. #100
DATE	10-20-16	DATE	10-20-16
TIME	10:30 AM	TIME	10:30 AM
LOCATION	1000 S. 10th St. #100	LOCATION	1000 S. 10th St. #100
OFFICER	1000 S. 10th St. #100	OFFICER	1000 S. 10th St. #100
REPORT	1000 S. 10th St. #100	REPORT	1000 S. 10th St. #100
REMARKS	1000 S. 10th St. #100	REMARKS	1000 S. 10th St. #100
INITIALS	1000 S. 10th St. #100	INITIALS	1000 S. 10th St. #100
SIGNATURE	1000 S. 10th St. #100	SIGNATURE	1000 S. 10th St. #100





# PAVED ACCESS ROAD

NOV 20 1977

construction

DATE		27 APR 78	BY	FRP/DO
PROJECT		HAWAIIAN AIR FORCE		
DESIGNED BY		FEDERAL AVIATION ADMINISTRATION		
CHECKED BY		TECHNICAL OPERATIONS		
APPROVED BY		PAPI		
CONSTRUCTION		RUNWAY 12		
DATE		ASPHALT ROAD		
BY		HAWAIIAN AIR FORCE		
DATE		NOV 20 1977		
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